

**545OneDrive2\_00019402**

# EPAct Program Update for Chet France

Module A – Status and Budget

January 27, 2008

*Preliminary information – not for release outside EPA*

## **Status of Testing**

- Phase 1 testing complete
  - 75F testing of 19 vehicles on 3 fuels (E0, E10, E15)
  - Data was received by EPA, briefing materials were presented on primary findings
- Interim FTP-cycle testing complete
  - 75F testing of 6 vehicles on 3 fuels (E0, E10, E15)
  - Data was received by EPA, this briefing contains primary findings
- Phase 2 testing underway
  - 50F testing of 19 vehicles on 3 fuels (E0, E10, E15)
  - Fuel 17 and 18 testing were recently completed
  - Fuel 19 testing has begun, to be completed by 2/6
    - Data is being processed at SWRI and here
- Phase 3 testing expected to begin mid-February

## **Fuel Blending Is On-Schedule**

- Test fuel development being done cooperatively by Haltermann and ASD
  - EPA defines fuel recipes
  - Haltermann prepares hand blends, bulk blends and performs fuel analyses
- 21 of the 28 fuels needed in Phase 3 have been or are being blended in bulk
  - 8 have been delivered to SWRI
  - E85 fuel will be obtained from CRC
- The remaining 7 fuels are in hand blend stage
- We expect to have all fuels blended in bulk by mid-February
- This will allow randomization of fuels for Phase 3, as planned

**Revised EPAct Fuel Matrix**

Fuel #	T50	T90	ETOH	RVP	ARO
	°F	°F	%	psi	%
1	150	300	10	10	15
2	240	340	0	10	15
3	220	300	10	7	15
4	220	340	10	10	15
5	240	300	0	7	40
6	190	340	10	7	15
7	190	300	0	7	15
8	220	300	0	10	15
9	190	340	0	10	40
10	220	340	10	7	40
11	190	300	10	10	40
12	150	340	10	10	40
13	220	340	0	7	40
14	190	340	0	7	15
15	190	300	0	10	40
16	220	300	10	7	40
17	215	325	0	9	30
18	202	325	10	9	25
19	195	325	15	9	23
20	160	300	20	7	15
21	160	300	20	7	40
22	160	300	20	10	15
23	160	340	20	7	15
24	160	340	20	10	15
25	160	340	20	10	40
26	150	340	15	10	40
27	190	340	15	7	15
28	190	300	15	7	40
29	TBD	TBD	85	TBD	TBD
30	150	325	10	10	40
31	160	325	20	10	15

Phases 1 and 2

RFS 2 Subset (EPA/DOE)

(Fuels 17-19)

Phase 3

Additional Fuels (DOE)

(Fuels 20-29)

E85 (DOE)

CRC Additional Fuels

Base Program (EPA)

(Fuels 1-16)

Revised Fuels

**Budget Considerations Going Forward**

- Original program cost estimate: \$4,271,000
- Cost overrun wrt the original scope of program: **EX. 4 - CBI**
- Cost overrun including additional projects: **EX. 4 - CBI**
- ASD staff continuously interacts with SwRI to control costs while still keeping the program intact

<i>Program or Project</i>	<i>Cost</i>	<i>Cumulative Cost</i>	<i>Difference of Total From the Original Estimate of \$4,271,000</i>
EPAct Program, April 2008 Cost Estimate	\$ 4,271,000	-	-
EPAct Program, January 2009 Cost Estimate*	\$ 4,698,100	<b>EX. 4 - CBI</b>	
Fuel Cost Adjustment			
FTP Testing (Partially Completed)			
EFM Resolution (Completed)			
Miscellaneous			
Blending of Two CRC Fuels			
Emission Testing of Two CRC Fuels			
<b>EX. 4 - CBI</b>			
ADDITIONAL PROJECTS			

May increase by \$100,000 due to additional Phase 2 costs

## **Budget Considerations Going Forward (Cont'd)**

- Funds spent or incurred as of Jan. 27, 2009: **Ex. 4 - CBI**
- Phase 3 (Starts in Feb. 2009): **Ex. 4 - CBI**
- Testing of CRC fuels: **Ex. 4 - CBI**
- Current shortfall: **Ex. 4 - CBI**

### **Options to reduce cost:**

- Delay testing of CRC fuels: \$250,000
- Reduce the number of test fuels
  - Reduction on the number of fuels by 1-2 would drop the G-efficiency of emission models below the minimum acceptable limit of 50%
- Reduce the number test vehicles
  - Reduction of the number of vehicles from 19 to 15 doubles the probability of getting a non-significant result
  - Reducing the number of test replicates from 2 to 1 has an even stronger impact
- Eliminate continuous THC, NOx.... measurements in raw exhaust
  - Would make critical types of information unavailable
- Eliminate speciated exhaust HCs/oxygenates
  - Important for anti-backsliding
- Request additional DOE support

## **Summary of Current/Recent Test Programs**

<b>Informal Title</b>	<b>Parties</b>	<b>Contractor</b>	<b>Est. Completion</b>	<b>Est. Cost (ASD)</b>	<b>Funding by others</b>	<b>Contact</b>
Light Duty Exhaust Fuel Effects	EPA, CRC, DOE	SwRI	Mar 2010	\$5.4M	\$1.2M NREL \$250k CRC	Rafal
Effect of Oil Age on PM	EPA	None	Complete	\$40k		Mike C.
PM Speciation	EPA (ASD/ORD)	Arcadis/EPA	Late 2009	\$345k	\$895k ORD	Mike C.
In-Use Sulfur Effects	EPA, possibly autos	None	Early 2010		\$730k OAR	Kent
Light Duty Evap (E77-2)	EPA, DOE, CRC	ATL	Complete		\$379k CRC \$100k NREL	Connie
Light Duty Evap (E77-2b)	EPA, CRC, NREL	ATL via SwRI	Late 2009	\$700k		Connie
Light Duty Evap (E77-2c)	EPA, CRC, NREL	SwRI	Mid-2009		\$250k CRC \$125-\$250k NREL	Connie
Evap High Emitters (E77-3)	EPA, CDPHE	ERG	Late 2009?	\$1M		Connie
Nonroad Exhaust 1	EPA, DOE	Intertek Carnot	Early 2009	\$844k		Cheryl
Nonroad Exhaust 2	EPA, CARB	SwRI	June 2009	\$500k	\$507k CARB	Cheryl



**Projected Schedule Going Forward**

- Launch of Phase 3 testing: Mid-February 2009
- Completion of Phase 3 testing: Early December 2009
- Reporting: December 2009 – mid-March 2010

	JAN 2009	FEB 2009	MAR 2009	APR 2009	MAY 2009	JUN 2009	JUL 2009	AUG 2009	SEP 2009	OCT 2009	NOV 2009	DEC 2009
Phase 1 <sup>a</sup>	14 weeks											
50F setup	3 weeks											
Phase 2 <sup>b</sup>	9 weeks	4 5 6 7 8 9										
50F teardown	2 weeks											
Phase 3 <sup>a</sup>	26 weeks		1 2 3 4 5 6 7	8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26								
NREL fuels <sup>a</sup>	17 weeks							1 2 3 4 5 6 7	8 9 10 11 12 13 14 15 16 17			
CRC fuels	4 weeks											1 2 3
NREL high emitter	2 weeks											
draft final report	6 weeks											
EPA/NREL review	4 weeks											
final report	4 weeks											

	JAN 2010	FEB 2010	MAR 2010	APR 2010	MAY 2010	JUN 2010	JUL 2010	AUG 2010	SEP 2010	OCT 2010	NOV 2010	DEC 2010
Phase 1 <sup>a</sup>	5 12 19 26	2 9 16 23	2 9 16 23 30	6 13 20 27	4 11 18 25	1 8 15 22 29	6 13 20 27	3 10 17 24 31	7 14 21 28	5 12 19 26	2 9 16 23 30	7 14 21 28
50F setup												
Phase 2 <sup>b</sup>												
50F teardown												
Phase 3 <sup>a</sup>												
NREL fuels <sup>a</sup>												
CRC fuels	4 weeks	4										
NREL high emitter	2 weeks	1 2 3										
draft final report	6 weeks	4 5 6										
EPA/NREL review	4 weeks	1 2 3 4										
final report	4 weeks		1 2 3 4									

## **Summary of Next Steps**

- Complete analysis of FTP cycle effect
  - E15 data is still pending
- Complete Phase 2 testing & analysis
  - Analyze and present results for E10 and E15 fuels
- Complete fuel blending and delivery to SwRI
- Perform Phase 3 testing

# Additional Slides

## **Light Duty Exhaust Program Summary**

- EPA/DOE collaboration
- Objective: Establish effects of RVP, T50, T90, aromatic content and EtOH on exhaust emissions from Tier 2 vehicles
- Fuel matrix includes 29 fuels + 2 added by CRC = total of 31
- Test Program Design
  - Phase 1: RFS 2 Pilot at 75°F
    - 3 fuels (E0, E10 and E15) tested in 19 vehicles
    - Test results to be available for RFS 2 NPRM
  - Phase 2: RFS 2 Pilot at 50°F
    - Same as Phase 1, except temperature
  - Phase 3: Main Program
    - 27 fuels tested in 19 Tier 2 vehicles, E85 tested in 4 FFVs
- LA92 test cycle used throughout the program
- Species measured: Regulated emissions, CO<sub>2</sub>, NO<sub>2</sub>, VOCs, ethanol, carbonyl compounds
  - N<sub>2</sub>O, NH<sub>3</sub> and HCN by FTIR
  - Some PM and SVOC speciation

## **Measured Species**

- Bag (phase) level and composite emissions of THC, NMHC, NMOG, CO, CO<sub>2</sub>, NO<sub>x</sub>, NO<sub>2</sub>, ethanol and PM
- Bag (phase) level speciated volatile organic compounds (VOCs)
  - Over 200 compounds, incl. alcohols and carbonyls
- Continuous and integrated by bag (phase) emissions of the following species in raw exhaust:
  - THC, NMHC, CO, CO<sub>2</sub>, NO<sub>x</sub>
  - N<sub>2</sub>O, NH<sub>3</sub> and HCN by FTIR for a subset of tests
- Semi-volatile and high molecular weight VOC and PM measured in Phases 1 and 2 only